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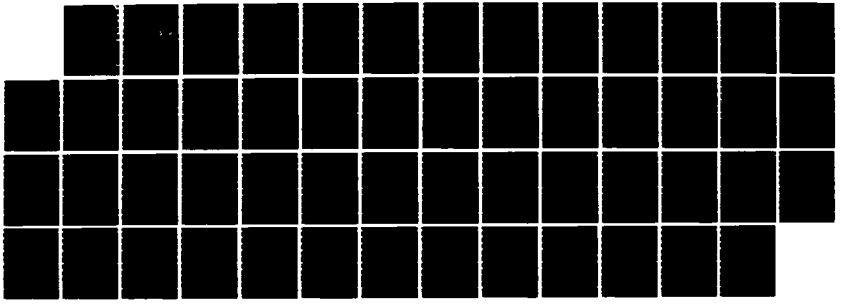

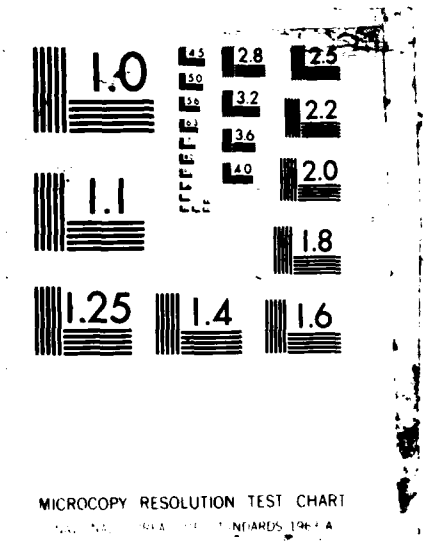
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BAR CODING THE U.S. GOVERNMENT BILL OF LADING AND THE MATERIAL INSPECTION AND RECEIVING REPORT

December 1984

John B. Handy
John R. Symons
Joseph R. Wilk

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER A179412
4. TITLE (and Subtitle) BAR CODING THE U.S. GOVERNMENT BILL OF LADING AND THE MATERIAL INSPECTION AND RECEIVING REPORT		5. TYPE OF REPORT & PERIOD COVERED Final 6. PERFORMING ORG. REPORT NUMBER LMI Task NA402
7. AUTHOR(s) John B. Handy John R. Symons Joseph R. Wilk		8. CONTRACT OR GRANT NUMBER(s) MDA903-81-C-0166
9. PERFORMING ORGANIZATION NAME AND ADDRESS Logistics Management Institute 6400 Goldsboro Road Bethesda, MD 20817-5886		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Commander, Naval Supply Systems Command		12. REPORT DATE December 1984 13. NUMBER OF PAGES 50
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

"A" Approved for public release; distribution is unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

LOGMARS, Bar Code, Bar Coded Documents, ~~GBL, Government~~ Bill of Lading, ~~DD 250~~, Material Inspection and Receiving Report, Automatic Identification

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Bar coding has potential for speed and savings in Defense logistics. Two forms offer ways to test that potential. One is the U.S. Government Bill of Lading (GBL). The other is the Material Inspection and Receiving Report (DD Form 250). This report summarizes the use of both forms within each of the Military Services and Defense Agencies. It recommends that the GBL number be bar coded on the GBL as an incentive toward modernization of today's labor-intensive and unwieldy use of the form. The report recommends prototype

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testing of bar coding the DD Form 250 to determine if the benefits anticipated from bar codes in the supply receiving process justify the costs to contractors of bar coding the form. Keywords:

1-19

Executive Summary

BAR CODING THE U.S. GOVERNMENT BILL OF LADING AND THE MATERIAL INSPECTION AND RECEIVING REPORT

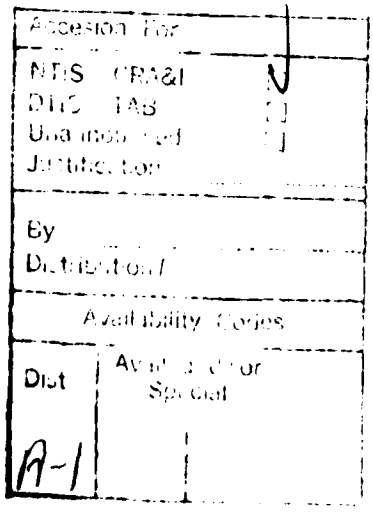
Bar coding has potential for speed and savings in Defense logistics. Two forms offer ways to test that potential. One is the U.S. Government Bill of Lading (GBL). The other is the Material Inspection and Receiving Report (DD Form 250).

The GBL serves as a contract between Government and freight carrier. Its use is labor-intensive and unwieldy. Mailing, sorting, filing, and retrieving are essential parts of the process. Cargo recipients must compare their copies with carrier copies, and discrepancies necessitate reports duplicating much of the GBL data. Payment offices with automated data systems must input GBL data manually. Even when the GBLs are prepared on automated systems, the information they carry is almost never forwarded electronically.

Bar coding the GBL number on the form would remove the key barrier to electronic data transfer. It would provide incentive to take the other steps necessary to bring it about. The result would then be a streamlined, less expensive GBL process and more responsive transportation systems. We recommend bar coding the GBL number.

The DD Form 250 serves several purposes: certifying acceptance of product quality, reporting status of contract fulfillment, receiving material into the supply system, and justifying payments. Only in the receiving function is it used to call upon data prepositioned in automated systems. While bar coding four data elements would speed receiving and improve the accuracy of records, it is not clear that the benefits would justify contractors' bar coding costs.

We recommend a prototype test of bar coding the DD Form 250 to provide a better basis for relating benefits to costs.



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1. INTRODUCTION

BACKGROUND

The Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) program was chartered in 1976 by the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics). Initial LOGMARS objectives were to establish a standard machine-readable symbology for marking packages and selected documentation, and to develop procedures for using the symbology.

The LOGMARS program is now implementing applications of bar coding technology in DoD logistics systems. Each DoD Component, in addition to pursuing its own applications, can be tasked by the LOGMARS Coordinating Group to take the lead in evaluating the application of bar coding to certain logistics processes DoD-wide. The Navy was designated the lead Service to evaluate bar coding of the U.S. Government Bill of Lading (GBL) and the Material Inspection and Receiving Report (DD Form 250).

The Naval Supply Systems Command (NAVSUP), the Navy's focal point for LOGMARS, tasked the Logistics Management Institute (LMI) to analyze specific applications and, where feasible, to design and recommend a joint-Service test of a prototype system that makes use of bar coding the GBL and/or DD 250. This report describes LMI's contributions in support of the joint LOGMARS effort.

The study focuses on the potential for immediate benefits of DoD-wide application of bar coding the GBL and DD 250. Our recommendations are based on information obtained from a March 1984 NAVSUP survey of DoD components, and the General Services Administration (GSA), and site visits to 19 field activities involved with GBL and DD 250 preparation and processing.

REPORT OUTLINE

The remainder of this report is divided into three chapters. Chapter 2 covers the GBL, Chapter 3 the DD 250. Each of these chapters covers general procedures for use of the form and survey results; the current process and ADP interfaces for each Service or Agency; and the bar coding potential. Chapter 4 consists of conclusions and recommendations.

2. U.S. GOVERNMENT BILL OF LADING

GENERAL PROCEDURES

The GBL is used for procurement of transportation and related services from commercial carriers when the carriers are paid directly. When a GBL is signed by both parties, it becomes a legal contract. The GBL is a serially-numbered, controlled document.

GBLs are issued by authorized transportation officers. Once the GBL is prepared and signed by the transportation officer or designated agent, all copies are turned over to a carrier. The carrier acknowledges receipt of the GBL and the shipment by filling in the carrier's name, the date the shipment was received, and the signature of the carrier's agent. After the original and all copies have been receipted by the carrier, the GBL is generally distributed as follows.

- Carrier: The original and three copies of the GBL are given to the carrier. The copies are for the carrier's own use; the original is later presented to the Government for payment. After the shipment is delivered and the carrier has been paid, the original GBL and payment voucher are forwarded to GSA for rate audit.
- Consignor: One copy is retained by the issuing office for the record.
- Consignee: One copy is forwarded to the consignee for information and planning.
- Financial Activity: One copy is forwarded to the DoD Component or GSA financial activity for funds management.
- Military Traffic Management Command (MTMC): One copy is forwarded to MTMC for analyses of shipping activity and preparation of traffic management reports.

PROJECT DATA CALL

In March 1984, NAVSUP issued a LOGMARS project data call that posed a multitude of questions about the existing GBL process, data requirements and

format for GBL preparation, use and disposition of the GBL, and automated processing support. Suggestions about a prototype bar coded GBL system were solicited. The data collection questionnaire is reprinted in Appendix A.

The data call was issued to each of the Military Services, the Defense Logistics Agency (DLA), and GSA. It elicited a variety of responses. See Table 2-1 for a summary of the numbers and kinds of respondents and Appendix B for a list of respondents. The Army responses come from two intermediate-level commands, an operating agency, and eight training posts. The Navy responses include several from systems command staffs, a few from major commands, two from overseas supply depots, and a dozen from other base-level activities, mainly naval air training and Pacific Fleet air stations. The Air Force response comes from two organizations. One represents base-level activities; the other, wholesale activities. The Marine Corps responses represent two recruit depots, two air stations, three Marine Corps bases, and both wholesale logistics depots. The response from DLA covered wholesale operations in one depot which it considers representative of its seven operating centers and depots. GSA provided a headquarters response reflecting operations at its ten depots.

TABLE 2-1. RESPONDENTS TO GBL DATA CALL

SERVICE/ AGENCY	BASE/UNIT LEVEL	WHOLESALE LEVEL	INTERMEDIATE COMMAND	HEADQUARTERS AND STAFF	OTHER	TOTAL
Army	8	--	2	--	1	11
Navy	12	2	3	6	2	25
Air Force	1	1	--	--	--	2
Marine Corps	6	2	--	--	1	9
DLA	--	1	--	--	--	1
GSA	--	--	--	1	--	1
TOTAL	27	6	5	7	4	49

The respondents described the GBL process, identification of regulatory requirements, forms usage, flow and disposition, and citation of policy and procedural directives and instructions. The content and nature of the replies varied from comprehensive, detailed responses to brief, general statements. Some replies did not address all questions, and others were incomplete or not representative of the primary users of the GBL.

Out of the abundance of information available, the analysis focused on a few key points: current automated processing capability, utilization of bar code technology, and the respondents' preferences for or against bar coding the GBL.

Table 2-2 summarizes responses concerning possession and use of automated methods and bar code equipment for GBL processing. None of the respondents reported using bar code equipment, and few field activities reported an automated capability for processing the GBL. (Gaps in the table signify non-responsive replies.)

TABLE 2-2. GBL PROCESSING CAPABILITIES

SERVICE/ AGENCY	NUMBER OF RESPONDENTS	AUTOMATED PROCESSING CAPABILITY		BAR CODE EQUIPMENT IN USE	
		YES	NO	YES	NO
Army	11	1	9	--	10
Navy (hqtrs./staff)	6	5	1	--	6
Navy (field/fleet)	19	2	15	--	17
Air Force	2	--	2	--	2
Marine Corps	9	2	5	--	6
DLA	1	1	--	--	1
GSA	1	1	--	--	1
TOTAL	49	12	32	--	43

Table 2-3 lists the preferences of respondents regarding bar coding information on the GBL. Of those indicating a preference, about half were for bar coding the GBL and half were against or indifferent. Twenty-one respondents did not indicate a preference.

TABLE 2-3. GBL BAR CODE PREFERENCES

SERVICE/ AGENCY	NUMBER OF RESPONDENTS	PREFERENCE		
		FOR	AGAINST	INDIFFERENT
Army	11	1	2	1
Navy	25	7	9	2
Air Force	2	2	--	--
Marine Corps	9	3	--	--
DLA	1	--	--	--
GSA	1	--	1	--
TOTAL	49	13	12	3

The respondents were also asked to list the minimal data elements that should be encoded, if a bar coded GBL processing system is adopted. The replies from the DoD Components are summarized in Table 2-4. GSA's response did not include this information. The Army, Air Force, and DLA choices collectively reflect a narrow range of data elements; the range of choices is wide in Navy and Marine Corps.

Many of the responses are not entirely logical because some of the data element choices are not typically shown on the GBL.

ARMY

Site Visited

Inbound and outbound GBL processing at New Cumberland Army Depot (NCAD), Pennsylvania.

TABLE 2-4. GBL DATA ELEMENT CODING PREFERENCES

GBL DATA ELEMENTS	ARMY	NAVY	AIR FORCE	MARINE CORPS	DLA	TOTAL FREQUENCY
GBL number	1	3	2	3	--	9
Transportation company	--	--	--	1	--	1
Issuing office	--	--	--	1	--	1
Consignor	--	--	--	1	--	1
Appropriation	--	--	--	1	--	1
Number of pieces	--	2	--	1	--	3
Piece number	--	5	--	2	--	7
Transportation control number	--	8	--	3	1	12
National stock number	--	6	--	2	1	9
Price (charges)	--	--	--	1	--	1
Contract number	--	1	--	--	--	1
Requisition number	--	2	--	1	--	3
Document number	--	6	--	2	1	9
Quantity	--	2	--	--	--	2
Unit of issue	--	3	--	--	--	3

Current GBL Process

Inbound GBL processing at Army storage depots is largely a manual process, but GBL tonnage data are then entered via remote terminal into the Army's Standard Depot System (SDS).

Advance GBL copies received by mail from consignors are dated and suspensed for 15 workdays, then filed by the last two digits of the GBL number. When the shipment arrives, the original documentation -- usually the freight bill and copy 2, 3, or 4 of the GBL -- is matched with the advance copy. Shortages and damages are noted and, when appropriate, Discrepancy in Shipment (DISREP) reports (SF 361) are prepared manually. When the entire inbound shipment has been received, the completed shipment is reported via GBL

number through a remote terminal of the SDS. This report consists largely of tonnage data. The GBL package is then filed for three years: the first year within the Inbound Freight Section, then in Records Staging for two more years.

Preparation of outbound GBLs in Army storage depots is an automated process. On the basis of transportation and supply data on the SDS, Freight Rate Specialists build GBLs, using four computer remote terminals in the Outbound Traffic Section. Shipping clerks collocated with the Freight Dispatch Unit review the completed GBLs for accuracy and make manually any corrections as required. Upon signature by the carrier, copies 5-9 are forwarded to the Bills Unit for breakdown and either filing or mailing. Copy 5 is the record file copy and is retained for three years at the storage depot. (GBLs for foreign military sales are retained for 12 years.) Copy 6 is mailed to the consignee, copy 7 is mailed to MTMC, Bayonne, New Jersey, and Copy 8 is forwarded to the financial activity of the DoD Component. Copy 9 is an extra fiscal copy; on DLA shipments, for example, copy 9 is forwarded to the DLA ICP for funds management.

NCAD, among the larger of the Army's 11 storage depots, generates 5,000 outbound GBLs a month, about 25 percent of its shipments. It processes 2,600 inbound GBLs a month.

ADP Interfaces

Outbound GBLs are prepared with standard supply and transportation data loaded on the SDS. National stock number (NSN), nomenclature, quantity, unit of issue, and requisition number/priority, as well as consignee, fund appropriation, weight, cube, and special-handling data (hazardous cargo, for instance) are included. Specific freight routing data are determined by Freight Rate Specialists and entered into the automated GBL process via remote terminals in the Outbound Traffic Section.

Key data elements on the GBL include the GBL serial number and the transportation control number (TCN). Also of importance is the type of cargo, mode, weight and cube, number of pieces, consignor/consignee, funds appropriation, and date shipped or received.

NAVY

Sites Visited

- Inbound and outbound GBL processing at the Naval Supply Center (NSC), Norfolk, Virginia.
- GBL processing for carrier payments and for traffic and financial information analyses at the Navy Material Transportation Office (NAVMTO), Norfolk, Virginia.

Current GBL Process

The NSC receiving office is notified in advance of incoming shipments by means of the consignee's copy of the GBL, which is marked with a suspense date and is filed by the last two digits of the GBL number. Suspense dates are reviewed regularly to determine whether follow-up action is needed. When the shipment arrives, one of the carrier's copies of the GBL is used to check for overages, shortages, or damage. This copy is matched with the advance consignee copy and, if no discrepancies are noted, the copies are filed together for possible research or audit. If discrepancies are found, a DISREP is prepared and forwarded to the consignor and the carrier. NSC Norfolk processes approximately 4,800 to 6,000 inbound GBLs a month. The office also prepares approximately 83 to 100 DISREPs monthly, but many of them are cancelled or reconciled locally without extensive action.

Most GBLs for outbound freight are computer-generated, though some manual entries are required. (GBLs for local shipments and hazardous cargo are prepared off-line.) Once prepared, GBL copies are generally distributed according to the procedures outlined earlier. If Navy funds are to pay for the shipment, no copy of the GBL is sent to the financial activity (i.e.,

NAVMTO). NSC Norfolk initiates approximately 4,400 shipments a month. Half use the GBL; most of the others use DD Form 1348-1.

GBL processing for carrier payment and financial and traffic management analyses is performed by NAVMTO. The process begins with receipt of an original GBL from the carrier certifying delivery. The GBL is reviewed for correctness, and a public voucher is prepared. A computer system prepares a check for carrier payment and a transaction record. A microfilm copy of the GBL is made and filed. The GBL original moves to the next stage for data entry into a second computer system, which prepares traffic and financial management reports. When all the data have been entered, the original GBLs are collected and mailed to GSA for rate audit. NAVMTO processes about 42,000 transactions a month for all types of source documents. In FY 1983, NAVMTO processed an average of 27,000 GBLs a month.

ADP Interfaces

Inbound GBLs are processed entirely by hand.

Outbound GBLs are computer-generated by means of the Navy Automated Documentation System (NAVADS). NSC Norfolk personnel estimate that 70 percent of the input data needed for GBL preparation are to be found in NAVADS files. These data are typically constant or repetitive data, such as carrier name and address, NSC name and address, and other addresses. NAVADS also assigns GBL numbers sequentially from a register of numbers allocated by GSA. The remaining data needed for the GBL are keyed manually into a remote terminal by a shipment clerk. These data are generally unique to that shipment: weight, cube, number of pieces, carrier code, consignee code, appropriation fund citations, etc. At NSC Norfolk, NAVADS is not yet fully operational.

GBL processing for carrier payments and for traffic and financial management reports is automated. NAVMTO has two independent computer systems

for processing GBLs (and other source documents). One is the Four Phase system used for GBL payment processing; the other is the Navy Automated Transportation Data System (NATADS) for financial information and traffic management. Data are entered into the Four Phase system by keyboard on one of 17 remote terminals. Seventeen data elements (for a freight shipment) are taken from the GBL, and some data are entered from the public voucher. The Four Phase system prepares payment checks in compliance with the Prompt Payment Act, and approximately half of its data entry workload is for GBLs. In the NATADS operation, 51 data elements from the freight GBL, used for preparing traffic and financial management reports, are keyed into one of 15 remote terminals. NATADS produces both local reports and data for the Freight Information System of the Military Traffic Management Command (MTMC).

AIR FORCE

Site Visited

Inbound and outbound GBL processing at Warner Robins Air Logistics Center (WRALC), Georgia.

Current GBL Process

Inbound GBL processing at Air Force storage depots is a manual process. An advance GBL copy (usually copy 6) of each inbound shipment is time-logged, suspensed (20 workdays), and filed by the last two digits of the GBL serial number. When the inbound shipment arrives, the advance copy is matched with the original GBL and the freight bill. In the event of a partial receipt, the GBL is suspensed for seven more workdays. If there is shortage or damage, a DISREP is prepared. When the inbound GBL is complete, the package is filed by month and by the last two digits of the GBL serial number for a period of three years.

Outbound GBL processing is also manual. Supply data (i.e., NSN, quantity, and requisition priority) are extracted from the DD 1348-1 shipping document. Transportation data (weight and cube, number of pieces, mode, carrier, and such information as hazardous-cargo data) are obtained from both the DD 1348-1 and the AFLC Form 1961 routing sheet. The GBL is typed and forwarded to the outbound dispatcher for signature by the carrier. Copies 1 - 4 accompany the freight; copies 5 - 9 are then logged and distributed by mail. Copy 5 is sent to MTMC Bayonne; copy 6 is sent to the consignee; copies 7 and 9 are retained for the file, and where appropriate, copy 8 is sent to the financial activity.

WRALC, with wholesale cargo volumes typical of the Air Force's five ALCs, prepares some 1,100 outbound, and 2,200 inbound GBLs per month.

ADP Interfaces

Neither inbound nor outbound GBL processing has any direct contact with existing ALC ADP systems. Key data elements on the GBL include the GBL serial number and the TCN. Also of importance are the type of cargo, mode, weight and cube, number of pieces, consignor/consignee, fund appropriation, and date shipped or received.

MARINE CORPS

Site Visited

Systems Branch, Deputy Chief of Staff for Installations and Logistics, Office of the Commandant, Arlington, Virginia.

Current GBL Process

Inbound GBL processing at the wholesale storage depots -- Albany, Georgia and Barstow, California, as well as every Marine Corps base -- is manual. Advance copies of inbound GBLs are time-logged, suspensed, and filed until receipt of the actual shipment. When the shipment arrives, the advance

copy is matched with the freight bill (and original GBL when available), processed, and filed. The carrier forwards the completed GBL to the Marine Corps Logistics Base (MCLB) at Albany for payment. All processes are manual.

Outbound shipment processing is also manual; the GBL is typewritten, and copies are forwarded, after carrier signature, by mail to the consignee, MCLB Albany, for funds management purposes, and to the area MTMC office at either Bayonne or Oakland.

Once a month, the Voucher Certification Branch at MCLB Albany forwards specific GBL shipping and payment data, by microfiche, to HQ MTMC, Washington, D.C., for entry into the MTMC Freight Information System (FINS).

ADP Interfaces

Inbound and outbound GBL processing have no direct contact with any Marine Corps ADP systems. Automated GBL preparation is planned for introduction into the Marine Corps Standard Supply System, a logistics system now under development. Typical outbound GBL workloads include 380-400 GBLs a month prepared at each Marine Corps wholesale storage depot and up to 700 GBLs prepared a month at the larger retail bases, e.g., Marine Corps Base (MCB), Camp Lejeune. Monthly inbound workloads consist of approximately 500 GBLs received at each of the two depots, and up to 1,000 GBLs at the larger retail bases, e.g., MCB Camp Lejeune. MCB Quantico, on the other hand, processes fewer than 100 inbound GBLs a month.

DEFENSE LOGISTICS AGENCY

Site Visited

Inbound and outbound GBL processing at Defense Depot, Ogden, Utah (DDOU).

Current GBL Process

GBL processing for inbound shipments begins with receipt of the advance (consignee) copy of the GBL. It is marked with a suspense date and

filed according to the last two digits of the GBL number. If the shipment does not arrive by the suspense date, follow-up action begins. When the shipment does arrive, one of the carrier's copies is used to verify that the numbers of pieces/boxes/pallets match the information on the GBL. The GBL is then signed and sent to the office, to be matched against the suspense copy. If there is no problem with the shipment, the GBL is microfilmed, and the paper copy is discarded. The microfilm is filed for research or audit. If there is a shipment discrepancy, a DISREP is prepared. One copy of the DISREP is filed; the others are mailed to the action offices. DDOU receives about 440 inbound GBLs a month.

GBLs for outbound freight are prepared by computer; a minimal amount of data (such as the GBL number) must be keyed at a remote terminal. After the computer prints the GBL, copies are generally distributed according to standard procedures. There are two exceptions. The first is that DDOU microfilms the consignor's copy immediately and discards the paper. The second exception is that copies of GBLs for shipments that will be paid for with Army, Air Force, or DLA funds are not mailed to the financial activity. Most other financial activities receive GBL copies through the mail in accordance with standard procedures. DDOU prepares about 8,800 outbound GBLs a month.

ADP Interfaces

Automated GBL preparation at DDOU is done by the DLA system called Mechanization of Freight and Shipping Terminals (MOFAST). The MOFAST system files contain virtually all the GBL input data needed. The most significant data element that requires manual keystroke entry on the remote terminal is the GBL number. Current plans call for partial GBL data concerning shipments funded by the Army, Air Force, and DLA to be sent soon, by magnetic tape, to the U.S. Army Finance and Accounting Center, Indianapolis, the financial activity for these DoD Components.

ARMY FINANCE AND ACCOUNTING CENTER

Site Visited

GBL processing for carrier payments at the Transportation Operations Division, U.S. Army Finance and Accounting Center, Indianapolis, Indiana.

Current GBL Process

The U.S. Army Finance and Accounting Center (USAFAC), Indianapolis, pays all GBL billings for the Army, Air Force, and DLA. The process begins with receipt of an original GBL and Public Voucher for Transportation Charges (SF 1113) from the carrier, certifying shipment delivery. After manual review and edit, the GBL billing data is keyed into remote terminals for eventual processing by the Disbursement and Report (D&R) System. This process is totally automated, resulting in issuance of a check to the carrier.

A second data-entry process then uses the original hard copy of the carrier-certified GBL to provide Headquarters MTMC with specific data about transportation movement and billing. This process is similar to, but more comprehensive than, the payment process; that is, data is entered at a remote terminal, for eventual entry by a magnetic tape that is mailed daily to HQ MTMC. MTMC uses this information to update the Freight Information System (FINS). Completed GBL packages are microfilmed for retention at USAFAC for at least six years and three months. Finally, the original paid-GBL packages are forwarded, after microfilming, to GSA, Washington, D.C., for rate audit.

USAFAC FY84 workloads include a monthly average of 207,000 GBLs processed. Original freight GBLs average 142,000; personal property, 27,000; and freight and personal property supplementals, 38,000. USAFAC pays approximately 85 percent of the DoD GBLs, including all Army, Air Force, and DLA shipments.

ADP Interfaces

USAFAC payment of carrier-certified GBLs is totally automated. To build the two GBL data bases -- one for bill payment, the other for transportation movement data and subsequent entry into MTMC's FINS -- 102 remote terminals are used. Up to 50 GBL data elements are entered by remote terminal to four stand-alone minicomputers; the information is later formatted for tape input onto the USAFAC mainframe computers. The data, retained in computer files for 6 months, can be accessed through remote terminals by either GBL or Voucher Payment numbers.

MILITARY TRAFFIC MANAGEMENT COMMAND

Site Visited

Freight Traffic Division, Headquarters, Military Traffic Management Command, Washington, D.C.

Current GBL Process

Approximately 900 shipping activities throughout DoD issue a total of about 130,000 GBLs a month. MTMC performs after-the-fact quality control on these documents, as follows: a copy of each GBL issued is provided, depending on the geographic location of the issuing office, to either MTMC Bayonne (Eastern Area) or MTMC Oakland (Western Area). [All copies are now mailed. In the near future, however, DLA activities will begin to provide key data elements via magnetic tape.] Twice a year, the MTMC area office (Bayonne or Oakland) screens ten percent of the GBLs prepared by each issuing activity. Proper preparation, selection of carrier, mode, and classification are the principal quality checks. This entire audit process is manual.

When discrepancies are detected, the MTMC area office notifies the issuing office via MTMC Form 39. Occasionally, the MTMC 39 results in the shipper's notifying the carrier of a GBL discrepancy via SF 1352 (Correction

Notice). Such a discrepancy is usually concerned with inaccurate classification of a shipment, e.g., shipping furniture at a "set up" rate when it is actually "knocked down."

In addition to performing quality checks on GBL preparation, MTMC assembles a comprehensive set of transportation movement data for the various shipments of passengers, cargo, freight, vehicles, and household goods. GBLs that have been processed by the various DoD GBL payment offices[1] are used to furnish HQ MTMC with specific movement data. Some 50 data elements are extracted from each GBL. These data are almost always mailed on magnetic tape on a regular basis to HQ MTMC for entry into the MTMC FINS. FINS edits and validates the data; then, a comprehensive set of transportation movement reports is produced for both government and commercial use. The reports are used largely to make sure that carriers are chosen fairly, to determine traffic pattern trends, to conduct various traffic analyses, and to compute future requirements for transportation funding.

ADP Interfaces

Quality control of GBL preparation is a manual process. On the other hand, GBL data used in the MTMC FINS is wholly automated. Most FINS data are entered on remote terminals at the paying offices for accumulation on magnetic tapes and subsequent mailing to HQ MTMC. (The data source is completed -- i.e., paid -- GBLs.) Marine GBLs are microfilmed at MCLB Albany and mailed to HQ MTMC for subsequent entry by MTMC personnel into the FINS.

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[1] GBL Payment Offices include:

(a) U.S. Army Finance and Accounting Office, Indianapolis, Indiana, pays for all Army, Air Force, and DLA-funded transportation movements.

(b) Navy Materiel Transportation Office, Norfolk, Virginia, pays for all Navy shipments.

(c) Marine Corps Finance Center, Kansas City, Missouri, pays for Marine Corps shipments only.

GENERAL SERVICES ADMINISTRATION

Sites Contacted

- Distribution Management Division, Headquarters GSA, Washington, D.C.
- Accounts Division, GSA Finance Center, Kansas City, Missouri.

Current GBL Process

Inbound shipments to GSA depots are seldom done by GBL because most material is purchased Free On Board (FOB) destination. GBLs that are received (FOB origin and inter-depot transfers) are handled much as they are within DoD, with an advance copy received by mail, filed in a suspense file, and matched with the shipper's copy when delivery is made. The process is entirely manual.

Outbound shipments are directed by GSA's Central Requisition Router (CRR), a Burroughs mainframe computer that feeds into printers at each of the agency's ten depots. The CRR processes requisition data through several decision tables to determine the most economical depot and most economical mode of transportation for the order. The system transmits data to the appropriate depot, where printers produce the GBL, picking documentation, mailing labels, and manifests. Some data are also transmitted to GSA's Kansas City Finance Center (although they are not now used in the payment process), and a paper copy of the GBL is prepared and mailed to GSA's Discrepancy Report Center, where it is filed and eventually microfilmed.

GSA's finance center in Kansas City now pays most of the agency's GBLs, but not all. By October 1985, the center will be responsible for the remainder. The process begins with receipt of a GBL by mail from the carrier along with a Public Voucher (SF 1113). A carrier vendor code is applied, the package is examined for completeness by voucher examiners, and data from both forms are keyed into the Transportation Reporting and Invoice Payment System

(TRIPS). The GBLs are then mailed to GSA Headquarters in Washington. D.C., for rate audit. GSA pays approximately 75,000 GBLs a month.

The GSA rate audit is completely manual. GBLs in hard copy are received from all of DoD (approximately 130,000 a month) and GSA (75,000 a month), as well as other government departments. They are temporarily stored and then shipped to one of several contractors who, among them, audit 100 percent of the forms. (GSA now has a two-year backlog of unaudited GBLs). There is no automation in the rate audit process.

ADP Interfaces

All GSA GBLs are prepared by the Centralized Requisition Router and printed at the appropriate depots. Financial and traffic management data are entered via keyboard into the TRIPS in Kansas City. The Finance Center informs us that an evaluation of the feasibility of producing GBLs with Optical Character Recognition (OCR) characters advised against the change because many of the data required by TRIPS are entered on the GBL by the carrier after the form has been produced. No CRR-produced GBL data is prepositioned in TRIPS.

POTENTIAL FOR BAR CODING

We did not observe any immediate benefits in bar coding GBL data at any of the sites we visited, and the responses to the project data call showed a variety of attitudes toward the usefulness of bar coding the GBL. The GBL process still includes a great deal of tedious manual labor, particularly in receipt processing (manual suspense files and preparation of DISREPs) and payment processing (keyboard entry of GBL data into traffic analysis-and-payment systems).

It is fortunate that GBL preparation is now -- or soon will be -- automated at most of the larger shipping activities, and we think that this

automation can be taken one step further. GBL data will already be available in electronic form at the source; the logical next step is to make the digitized data available to those users who must now resort to manual files, reports, and keyboard entry. Magnetic tapes mailed to payment offices, and either tapes or AUTODIN transmittal to consignees would provide prepositioned "electronic GBLs" that could be called up upon receipt of the shipment or invoice. Eliminating the retyping of many GBL data elements, from the SF 1103 to the SF361, would speed preparation of DISREPs, and it would be possible to dispense with manual suspense files entirely. Payment offices could nearly halve their manual keyboard entry requirements because many of the data now being keyed from the GBL would already be resident in these payment systems.

Bar coded GBL numbers would further accelerate the call-up of prepositioned data and should reduce the possibility of calling up the wrong record by miskeying GBL numbers. Until such data are prepositioned, the bar coded GBL number would yield benefits to no one (with the possible exception of the U.S. Army Finance and Accounting Center, where bar coding would help in a system being considered for tracking internal documents). We believe, however, that the bar coded GBL number might encourage early development of electronic transfer of GBL data.

We feel strongly that GBL processing should be more heavily automated. Bar coded GBL numbers could well be the catalyst that would encourage transportation managers and systems planners to consider the concepts proposed here.

3. MATERIAL INSPECTION AND RECEIVING REPORT

GENERAL PROCEDURES

The Material Inspection and Receiving Report (DD Form 250) is prepared, duplicated, and distributed by DoD contractors. It serves as evidence of quality assurance and acceptance, shipping notice, packing list, receiving document, contractor invoice, and support documentation for commercial invoices.

A DD 250 is generally required in contracts that call for delivery of discrete products. When contract administration is performed by the Military Service, use of a DD 250 is sometimes optional. Examples are contracts for less than $25,000, some food contracts, research and development contracts, level of effort contracts, and contracts for field services.

The DD 250 consists of an original and four carbons. For standard distribution, the DD 250 requires at least a dozen copies:

- Shipment (4)
- Consignee (2)
- Contract administration office (1)
- Purchasing office (1)
- Payment office (4).

Special distribution requirements may triple the number of copies needed. Because the contract may call for multiple items, multiple shipments, and multiple consignees, the number of DD 250s prepared under a given contract may be substantial.

PROJECT DATA CALL

In March 1984, NAVSUP issued a LOGMARS project data call. The call posed a multitude of questions about existing DD 250 processes, data sources and format for DD 250 preparation, use and disposition of the DD 250, and automated processing support; and it solicited suggestions about a prototype bar coded DD 250 system. The data collection questionnaire is provided in Appendix A.

The data call was issued to the Military Services and DLA and evoked a variety of responses. (Although the DD 250 is a multipurpose form, the preponderance of responses addressed only the material-receiving aspects of its use.) The sole Army response came from the Army Materiel Command; the Navy responses included several from systems command staffs, a few from major commands, three from wholesale-level activities, and a dozen from base-level activities. The Air Force sent a coordinated response; two organizations representing base-level and wholesale-level activities. The Marine Corps responses primarily represented two recuit depots, several base-level activities (air stations and bases), and both USMC wholesale depots. DLA sent a single response, representing all of its seven wholesale supply centers and depots. The numbers and kinds of respondents are summarized in Table 3-1. The responding organizations are listed in Appendix B.

The data call responses provided various descriptions of DD 250 processes, identified regulatory requirements, forms usage, flow, and disposition, and cited policy and procedural directives and instructions. The replies varied from comprehensive, detailed responses to brief, general statements. Some replies did not address all questions, and others were incomplete or not representative of DD 250 users.

TABLE 3-1. DD 250 DATA CALL RESPONDENTS

SERVICE/ AGENCY	BASE/UNIT LEVEL	WHOLESALE LEVEL	INTERMEDIATE COMMAND	HEADQUARTERS AND STAFF	OTHER	TOTAL
Army	--	--	1	--	--	1
Navy	12	3	3	6	1	25
Air Force	1	1	--	--	--	2
Marine Corps	7	2	--	--	1	10
DLA	--	1	--	--	--	1
TOTAL	20	7	4	6	2	39

Of the abundance of information that the responses provided, we focused our analysis on a few key points: automated processing capability, utilization of bar code technology, and the respondents' preference for bar coding the DD 250.

In Table 3-2, the responses indicate the existence of automated methods and bar code equipment for processing DD 250s. Only one of the respondents reported using bar code equipment, though about half of the respondents have automated capability for processing the DD 250 in the material receiving function. (Table entries do not add up to the total number of respondents because some of the replies did not respond to this question.)

TABLE 3-2. DD 250 PROCESSING CAPABILITIES

SERVICE/ AGENCY	NUMBER OF RESPONDENTS	AUTOMATED-PROCESSING CAPABILITY		BAR CODE EQUIPMENT IN USE	
		YES	NO	YES	NO
Army	1	1	--	--	1
Navy (hqtrs. or staff)	6	2	2	--	3
Navy (field or fleet)	19	11	8	--	19
Air Force	2	1	1	1	1
Marine Corps	10	2	6	--	8
DLA	1	1	--	--	1
TOTAL	39	18	17	1	33

Table 3-3 shows the respondents' preferences for or against bar coding the DD 250. (Replies not categorized by preference were either nonresponsive or unknown.) Although nearly half of the replies appear nonresponsive, it should be noted that the data call did not address this question directly. The table shows mainly that the respondents are divided in their preferences.

TABLE 3-3. DD 250 BAR CODE PREFERENCES

SERVICE/ AGENCY	NUMBER OF RESPONDENTS	PREFERENCE		
		FOR	AGAINST	INDIFFERENT
Army	1	--	--	--
Navy	25	5	8	1
Air Force	2	1	--	--
Marine Corps	10	4	2	--
DLA	1	--	--	--
TOTAL	39	10	10	1

The respondents were also asked to state which DD 250 data elements should be encoded, if a bar coded DD 250 processing system is instituted. Table 3-4 summarizes the replies. The choices of the Navy and Marine Corps range over more than a dozen data elements; the preferences of the Air Force and DLA cover a much narrower range. The most prevalent choices of DD 250 data elements are the procurement instrument identification (contract number), transportation control number, national stock number, quantity, and unit of issue. The last four data elements on the table are not included in the instructions for preparing the DD 250, as stated in the Federal Acquisition Regulation. One of these data elements -- the document number -- has often been selected for bar coding by respondents. It is apparent that respondents are using "document number" interchangeably with "requisition number;" the "requisition number," therefore, should be included among the most prevalent choices.

TABLE 3-4. DD 250 DATA ELEMENT CODING PREFERENCES

BLOCK NUMBER	DATA ELEMENT	NAVY	AIR FORCE	MARINE CORPS	DLA	TOTAL FREQUENCY
1	Procurement instrument identification (contract)	3	1	2	--	6
1	Order number	1	1	--	1	3
2	Shipment number	1	1	--	1	3
4	Bill of Lading number	--	--	2	--	2
4	Transportation control number	5	--	2	--	7
11	Shipped from (code)	--	--	1	--	1
14	Marked for	1[a]	--	2[b]	--	3
15	Item number	1	--	--	1	2
16	National stock number	7[c]	1	2	1	11
16	Description	--	--	2	--	2
16	Serial or lot number	1	--	--	--	1
16	Requisition number	--	--	2	--	2
16	Appropriation	--	--	1	--	1
17	Quantity	4	--	2	1	7
18	Unit	4	1	1	--	6
19	Unit price	2	--	--	--	2
20	Amount	1	--	--	--	1
--	Document number	7	1	3	--	11
--	Piece number	4	--	1	--	5
--	Number of pieces	--	--	2	--	2
--	Document identifier	--	--	1	--	1

[a]Response stated "routing identifier."

[b]Responses stated "project code" and "supplementary address."

[c]One response also specified "cognizance symbol."

ARMY

Sites Visited

- Contract administration and contractor payment at Communications/ Electronics Command (CECOM), New Jersey.

- Receipt processing at New Cumberland Army Depot (NCAD), Pennsylvania.

Current DD 250 Process

Army logistics makes extensive use of the DD 250. Procurement offices require contractors to furnish multiple copies of the DD 250 with every delivery. Quality assurance inspectors use the DD 250 for formal acceptance of the deliverable into the DoD system. Storage depots use the DD 250 to receive the deliverable into the Army's Standard Depot System (SDS). Finance and accounting uses the DD 250 as a voucher file copy to effect payment for the deliverable. Finally, procurement keeps the DD 250 in its completed contract files, reflecting acceptance and receipt of the deliverable.

At CECOM, the contracting function employs the Procurement Automated Data Documentation System (PADDS), a standard Army data system to prepare contract documentation automatically. PADDS also provides the SDS storage system with Pre-Positioned Material Receipt Card (PPMRC) data. PPMRC data are used at Army storage depots to assist in the receipt of new item procurements.

With the exception of Fast Pay contracts, all Army vendors are required by contract to prepare a DD 250 in multiple copies. Generally, up to four copies accompany the deliverable; other copies are forwarded by mail to the consignee, the payment office, and the contracting office.

In the receiving process, the DD 250 is used to check in deliverables. A careful review is made of the DD 250 contract, order, and line or item numbers, as well as the NSN and quantity. These data are compared with the PPMRC data on SDS remote terminals in Receiving. Upon receipt of the deliverable into the SDS, the DD 250 is filed, when applicable, with contract files in Central Receiving (mission stock contracts). On destination acceptance contracts, the DD 250 is used as a source document for preparing the Military Standard Contract Administration Procedures (MILSCAP) acceptance reports (PKx cards).

CECOM generates on its automated PADDS about 60 percent of its 30,000 contractual actions a year (including new contracts, contract modifications, and change orders). (The figure is expected to rise to 90 percent by 1986.) Some 100,000 PPMRCs are generated by these contract actions.

At NCAD, a wholesale storage depot, about 60 percent of the receipts (8,800 to 11,000 receipts a month) are new procurements, many of which are accompanied by DD 250 documentation. In addition, about 80 percent of NCAD vendor receipts are preceded by PPMRC data.

ADP Interfaces

The DD 250 is prepared manually by vendors with contractual data generated by PADDS. Upon receipt, the DD 250 is matched with PPMRC data loaded on the SDS. As the receipt is processed, DD 250 data are used to effect vendor payment via the Army finance and accounting system; the DD 250 is also filed as a source document in the official contract file.

Key DD 250 data elements include contract, order, and contract line/sub-line item numbers, NSN, price and quantity. Also of importance are the nomenclature, document number, unit of issue, acceptance point, shipment number, paying office, and consignor and consignee elements. Each of these data elements is entered manually on the DD 250 by the vendor.

NAVY

Sites Visited

- Contract administration at the Aviation Supply Office (ASO)
- Naval Publications and Forms Center (NPFC), for contractor payments on ASO contracts
- Naval Supply Center (NSC) Norfolk, for receipt of material from commercial sources.

Current DD 250 Process

The purpose of the DD 250 in ASO operations is to provide data for updating or finalizing contract status files. The process begins with the

daily arrival of DD 250s by mail. The form is first examined to determine whether it represents an interim or final shipment. If it is not a final shipment, the DD 250 is discarded without further action. If it is a final shipment, however, data from the DD 250 are entered into an ADP system to update contract status. The DD 250 is then discarded. ASO processes approximately 2,600 DD 250s a month in this manner. This workload represents approximately five percent of the total workload in the Data Control Input Branch at ASO.

The purpose of DD 250 processing at NPFC is to make payments to contractors on ASO contracts. The process begins with receipt of DD 250s by mail; the forms are reviewed for obvious errors and marked with the date and time of arrival. Next, data from the DD 250 are entered into an ADP system by remote terminal keyboard. Routine DD 250s require the entry of seven or eight data elements. Additional entries are required for atypical DD 250s, such as those for missiles or material for foreign military sales. If the inputs result in valid entries to the ADP system files, the computer automatically prepares the check for contractor payment. The DD 250 is then filed by action date. If the input is invalid, the DD 250 is sent to ASO for research and resolution. Most problems are corrected overnight, and the DD 250 data are reentered the next day. About ten percent of the DD 250s have to be handled more than once. NPFC processes approximately 340 contractor invoices daily; of these, 75 percent are either DD 250 invoices or commercial invoices supported by the DD 250.

DD 250 processing at NSC Norfolk is the receiving function for material arriving from commercial sources. The process begins with the arrival of material at the loading docks. After it is unloaded, it moves with its documentation on a conveyor to a checking station. A checker removes the

DD 250 (and other paperwork) from the carton, checks the documentation against the material, and passes the documentation to a remote terminal station alongside the conveyor. The terminal station has a keyboard, monitor screen, and printer connected directly to the Center's ADP system.

The operator chooses DD 250 data elements for entry according to various conditions. If there is a valid "due-in" prepositioned in the computer system, two data element entries are needed if a single delivery is expected, four if the receipt is one of several deliveries expected. If there is no "due-in" record, most of the DD 250 data must be entered.

The computer then generates a Material Movement Document (MMD), with a locally assigned control number, on-line at the remote terminal station. The control number is used to direct and track the material until it is stored in its assigned location. The first copy of the DD 250 is microfilmed, and the film is filed. The paper copy of the DD 250 is placed in local archives. The material, MMD, and remaining copies of the DD 250 move to the computer-assigned storage location shown on the MMD. The material is stored, and the DD 250s are discarded.

In July 1984, NSC Norfolk processed 67,668 receipts, consisting of 31,780 receipts of standard stock items and 35,888 turn-ins. The standard stock receipts include 9,093 via the DD 250, or 29 percent of standard stock receipts and 13 percent of total receipts. Approximately ten percent of the DD 250 receipts require inspection at NSC Norfolk; the remainder are source-inspected.

ADP Interfaces

For contract status information, ASO has an ADP system called the Automated Contract Administration File, also referred to as the F02 system. DD 250 data are entered into this system via Nixdorf remote terminals. The

DD 250 data elements used are: contract number (and call or order number), shipment number, date shipped, activity "shipped to," mode of shipment, activity "marked for," contract line item number and sub-line number, and quantity shipped. Some of the data elements are represented by codes; others must be spelled out.

To pay contractors for ASO procurements, NPFC uses the Integrated Disbursing and Accounting subsystem of the Uniform Inventory Control Program, known locally as the G06 system. The G06 data entry unit has five terminal operators, who key in data directly from DD 250. The data elements entered are: contract number (and call or order number), invoice number and date, contract line item number, quantity, unit price, and total amount (i.e., the grand total on the DD 250, not the extended-line item total). Additional data element entries are required for certain cases. NPFC is now testing with the General Electric Company an ADP initiative in which the contractor bills the Government by sending invoices on magnetic tape. Other contractors are interested in participating.

NSC Norfolk uses the Navy's standard Uniform Automated Data Processing System (UADPS), Application "B"-Enhanced (ABE) for all of its material management functions, including receiving. To process commercial receipts in UADPS-ABE, DD 250 data are keyed into a remote terminal at the conveyor receiving line. The data elements that are needed depend on specific conditions. If there is a valid "due-in" prepositioned in the system and only one delivery is expected, the data elements are the National Item Identification Number (NIIN) and the last four digits of the contract number. If there is a valid "due-in" but multiple deliveries are expected, the data elements are the NIIN, last four digits of the contract number, contract call or order number, and contract line item number. If there is no prepositioned "due-in," most of the DD 250 data must be entered.

Eighty-three percent of all receipts at NSC Norfolk have valid prepositioned "due-in" records resident in UADPS-ABE. NSC personnel say that the percentage is higher for DD 250-type receipts.

AIR FORCE

Site Visited

Receipt processing at Warner Robins Air Logistics Center (WRALC), Georgia.

Current DD 250 Process

The DD 250 is used to receive items into the Air Force supply system. For Air Force "prime" receipts (items ordered by the wholesale item manager), the DD 250 almost always accompanies contractor shipments. Upon receipt, the form is compared with prepositioned material receipt data loaded on the Texas Instruments (TI) 990 minicomputer (via a weekly interface with the J041, ALC Procurement System) for correct data entries. The delivery is then formally received into the D033 supply system. (Since 1983, WRALC has been testing for the best way to call up prepositioned contract receipt data on its remote terminals, linked to a dedicated TI 990 computer in Receiving. To keep DD 250 in-processing error to a minimum, WRALC finds it necessary to key in the contract number and the 10th and 11th positions of the NSN.) For "local purchase" receipts (items procured by Base Contracting for consumption at WRALC), five copies of the DD 250 are prepared by WRALC personnel manually for each receipt; two copies are retained by Receiving (one for processing, one for file); Stock Records, Accounting and Finance, and Contracting are provided with single copies. Receiving uses the typed "local purchase" DD 250 to process the deliverable into the supply system. Contractor payment is effected via the Accounting and Finance copy, and Contracting uses its copy of the form to update its "local purchase" contract files.

On "prime" receipts marked for source acceptance, only one copy of the DD 250 is retained. A second copy is forwarded to the paying office for contractor payment. On "prime" receipts marked for destination acceptance, two copies are filed in Receiving: one in date-received sequence, the other with the contract file. A third copy is forwarded to the paying office for contractor payment.

WRALC workloads are typical of the five wholesale storage depots in the Air Force. WRALC receives about 8,250 line items a month via DD 250. This represents 11 percent of the total receipts processed, both on-base and off-base. (Of the 8,250 receipts, approximately 2,200 are destination-acceptance DD 250s; the remainder are source-acceptance.)

About 50 percent of WRALC off-base receipts have prepositioned material receipt data loaded on the TI 990 minicomputer.

ADP Interfaces

The initial DD 250 is usually prepared by the contractor on the basis of data extracted from the contract. The one exception is "local purchase" items ordered for local base consumption. For these items, the vendor rarely prepares a DD 250; rather, the Local Purchase Service Unit prepares a DD 250 manually from contract file information. As the receipt is processed, DD 250 data is compared with prepositioned material receipt data to make sure that the deliverable is processed against the applicable contract number.

Key data elements are the contract number, NSN, order number, contract line item number, shipment number, date shipped, acceptance point, and fund appropriation citation. Of lesser importance are the nomenclature, paying office, administering office, contractor, and quantity.

MARINE CORPS

Site Visited

- Systems Branch, Deputy Chief of Staff for Installations and Logistics, Office of the Commandant, Arlington, Virginia.

Current DD 250 Process

The vendor-prepared DD 250 is used by Marine Corps receiving activities to generate reports of property received. At some bases, DD 250's are prepared manually to ease processing when receipt items are accompanied by vendor invoices only. At MCLB Albany, the DD 250 is used to post contract files maintained in receiving. In addition, copies of the DD 250 are used by Marine Corps disbursing offices to effect vendor payments.

Marine Corps receiving activities rarely use MILSTRAP (DUx/DWx) prepositioned material receipt card (PPMRC) data. PPMRC data is prepositioned at only the two Marine Corps wholesale storage sites -- Albany and Barstow -- and there only for material ordered by the Marine Corps Inventory Control Point at MCLB Albany. Although Army and DLA PPMRC data are available, they are not used by Marine Corps receiving activities.

The two wholesale storage depots process 800 to 1,000 DD 250s a month. Collectively, retail activities also in-process several hundred receipts a month via the DD 250.

ADP Interfaces

DD 250 receipts are keyed via remote terminals into the Marine Corps Uniform Materiel Management System (MUMMS), a standard Marine Corps system located at each of the principal bases. Key data elements include contract number, NSN, and document number.

DEFENSE LOGISTICS AGENCY

Sites Visited

DD 250 processing was observed at several field activities of DLA: Defense Contract Administration Services Region (DCASR), Philadelphia; Defense Industrial Supply Center (DISC); and Defense Depot, Ogden, Utah (DDOU). At the DCASR organization, DD 250 processing involves contract administration (including quality assurance) and contractor payment. At DISC, the DD 250 is used primarily for contractor payment. At DDOU, DD 250 processing is for the material-receiving function.

Current DD 250 Process

In the DCASR organization, the DD 250 process begins with quality assurance. Government quality assurance representatives (QARs) inspect contractor products (often at the contractor's manufacturing plant) to ensure procurement quality assurance (PQA). When the PQA review is satisfactorily completed, the QAR so indicates and accepts the material by checking blocks on the DD 250. The QAR reviews the form for correctness, adds his own name, office, date, and signature, and returns the form to the contractor for reproduction and distribution. One of the copies is sent to the DCASR organization for input into an automated contract-status system. Acquisition regulations permit several variations to this DD 250 quality assurance process, including: Alternate Release Procedure, Certificate of Conformance Procedure, Fast Pay, and acceptance of material at the Government destination rather than the manufacturing source. DD 250 copy distribution and processes generally remain the same except where destination acceptance is specified. In that case, the receiving activity mails the acceptance copy to the paying office.

When the DD 250 copy reaches the DCASR organization, it is used to update contract status records by revision of the scheduling file and the

on-order/delivery file. The form is also used to prepare contract status reports, a material acceptance payable report, and contractor payment checks. To accomplish this, the DCASR ADP system requires one basic input process using DD 250 data. DCASR Philadelphia makes about 240,000 contractor payments a year for the region.

At DISC, the DD 250 is used for contractor payments. When the DD 250 is received by mail, it is clocked in and examined for correctness by voucher examiners. DD 250 data are then keyed into an ADP system by remote terminal. If the DD 250 input matches the computer contract file, the computer prepares a payment check, a public voucher, and a list called a Voucher Book. Clerks double-check both the check and the voucher for accuracy. Any corrections must be coordinated with the DISC disbursing office. The payment checks are then mailed to the contractors; the vouchers, invoices, and original DD 250s are sent once a month to the Army's Accounting and Finance Center. The Voucher Books and a copy of the DD 250 are retained for research and audit purposes.

Most of DISC's contract dollar volume is in purchases of $25,000 or less, and nearly all of their procurement actions are concerned with small purchases. DISC estimates that it administered a total of 175,750 procurement actions for FY 1984. Of these, 138,000 were Fast Pay and required no DD 250s for payment. The remaining 37,750 did require the use of a DD 250. The Commercial Contract Accounting and Payment Office in DISC estimates that 2,200 DD 250-type invoices a month are processed for payment.

At DDOU, DD 250s are processed at the material receiving operation. The operation begins with receipt of material from commercial sources at the loading dock. When the boxes are unloaded, they are marked with the tailgate date (receipt date) and moved to a temporary staging area. From here, the

material is placed on one of two conveyor systems. One is for bulky or heavy items, the other for small items.

On the bulk receiving line, the material moves to an inspection station, where the cartons are opened and the paperwork is removed. If the DD 250 indicates that destination inspection is required, the inspector makes a complete inspection and verifies the total count. If the DD 250 indicates that inspection was performed at origin, the inspector makes some inspections and counts, especially for odd lots, when boxes appear damaged or previously opened, or where a vendor has a history of shipment errors.

After the inspection and count, the inspector enters DD 250 data into the DDOU ADP system. The inspection station is equipped with a remote terminal and printer for this purpose. Four DD 250 data elements are keyed in, unless the destination inspection was made after the tailgate date. If so, the tailgate date must also be input. The computer then generates an MMD at the inspection station's on-line remote printer. Among other information, the MMD includes the storage location for the material and a locally assigned control number. The material and MMD move via conveyor to the assigned storage location.

The DD 250 is signed and dated by the inspector and marked with the shipment weight, number of cartons, control number, location code, and a discrepancy code (if the shipment was discrepant). The form is then attached to a copy of the MMD and sent to the Receipt Documentation Office. If the DD 250 specifies inspection at origin, the DD 250 and related documentation are retained for file. If the DD 250 specifies destination inspection at DDOU, the DD 250 is handled in one of two ways. If the payment office is a DLA-managed Defense Supply Center, a signed copy of the DD 250 is mailed there. If the payment is to be made by a DCASR office, the DDOU ADP system

transmits the necessary data to the DCASR by AUTODIN. Generally, this process is fully automated, but several shipment-unique data elements from DD 250 must be input by computer remote terminal.

For receipt of small items, the material receiving and DD 250 processes are basically the same as the bulky items. Here we cite the differences only. One difference is that the small-item inspection stations are equipped with hand-held, laser-type bar code scanners, as well as remote terminals and printers. The other difference is in data entry into the DDOU ADP system. First, the scanners are used to read the NSN and contract number, which are bar coded on labels attached outside the container. If the read is successful, three or four additional DD 250 data elements are keyed into the remote terminal (call or order number, contract line item number, total weight and, if necessary, tailgate date). If unsuccessful, all six data elements must be keyed in from the DD 250. The remaining material receiving and DD 250 processes are essentially identical. DDOU processes approximately 44,000 receipts monthly -- half turn-ins, half from procurements. Of the 22,000 receipts from procurement, about 5,500 use the DD 250. The remainder come in on a variety of other documents.

ADP Interfaces

The ADP system used by DCASR for contract administration and contractor payment is called Mechanization of Contract Administration Services (MOCAS). DD 250 data entry for contractor payment is made at remote computer terminals. The DD 250 data elements used directly are: the contract number (including call or order number), shipment number, date shipped, invoice number and date, acceptance point, contract line item number, NSN, quantity, unit of issue, and the date the material was accepted. In addition, codes representing the "shipped to" activity and "marked for" activity are used.

The MOCAS system then generates the contractor payment check and supporting documentation. DCASR Philadelphia now processes some contractor payment checks -- for IBM, RCA, and GE, for example -- using invoices provided on magnetic tape.

The ADP system used by DISC for payment of contractor invoices is called Standard Automated Material Management System (SAMMS). Data are keyed in on Harris remote terminals. Fourteen data elements from the DD 250 are needed to produce the contractor payment check and supporting documents: contract number (including call or order number, when required), date shipped, mode of shipment, discount terms, invoice number and date, prime contractor, contract administration activity, payment office, "shipped to" activity, contract line item number, quantity, unit of issue, unit price, and amount.

The Defense Warehousing and Shipment Planning (DWASP) is the ADP system used by DDOU to process material receipts. Data entry into DWASP requires input of several DD 250 data elements. On the small-item receiving lines, the bar codes for contract number and NSN are scanned directly on the boxes. If the scan is successful, additional data from the DD 250 are keyed into a remote terminal. These data elements are contract call or order number, contract line item number, tailgate date (unless the same as current date), and total weight. If the scan was unsuccessful, all five data elements (six, if the date is needed) are keyed in. (On the bulky-item lines, the contract number and NSN are keyed in because scanners are not used. Other keyed entries are the same, except that weight is not entered.)

DWASP also provides the appropriate DCASR payment office with shipment information when inspections of receipts are made at DDOU (i.e., a destination-inspection DD 250). Most of the basic data are provided automatically, but some DD 250 data are keyed in at DDOU by remote terminal.

These data elements are shipment number, quantity shipped, quantity accepted, and payment office. The DWASP system transmits the data to the DCASR payment office by AUTODIN.

POTENTIAL FOR BAR CODING

Within DoD, the DD 250 is used for supply receipt, contract administration and vendor payment. Only supply activities use the form to call up prepositioned data. The information now bar coded on shipping containers (NSN and contract number) is not enough to link material received to prepositioned material receipt data and that keyboard entry from the DD 250 is still necessary. Bar coding specific data elements would speed receipt processing, but only for the portion of total receipts processed on the DD 250.

Bar coding would represent a formidable new tasking for contractors who generally prepare the DD 250s on standard typewriters. For source-acceptance items, the normal sequence of events calls for the original form to be signed by the government inspector, then duplicated by the contractor for distribution. Bar codes would have to be printed either directly on the form or on labels that would be attached to the form before duplication. Either method would require that contractors have bar coding capability.

An alternative method would be for the government to produce DD 250s with pertinent data preprinted and bar coded. These DD 250s would be given to the vendor as part of his contract package. We discussed this prospect with DCASR Indianapolis and were told that Government-produced DD 250s may be feasible for small contracts with a limited number of shipments but would be highly impractical for larger contracts that call for high volumes of shipments and, accordingly, many DD 250s.

The potential for bar coding the DD 250 exists, but determining whether the benefits would justify the additional cost to contractors (which would be passed on to the government) requires a prototype test.

4. CONCLUSIONS AND RECOMMENDATIONS

U.S. GOVERNMENT BILL OF LADING

In Chapter 2, we pointed out that we did not observe any immediate benefits in bar coding GBL data at any of the sites visited. The reason is that there is now no data entry into an automated system from the GBL in shipping and receiving. Although there is data entry in the payment and freight analysis processes, so many data elements must be keyed in from the GBL that bar coding is impractical.

Many of DoD's GBLs, and almost all of GSA's, are prepared on automated systems, yet few of the data are forwarded electronically to other Government users. Where automation exists (e.g., payment offices), a substantial amount of labor is expended to input data from the form into ADP systems. Where automation does not exist (e.g., consignee suspense files and DISREP preparation), we observed an unwieldy, labor-intensive process that is ripe for streamlining through automation.

We see the need for "electronic GBLs" transmitted by consignors to consignees, payment offices, and MTMC, where they would either be stored pending completion of shipment or be used immediately for traffic analysis. The justification and design of such systems are beyond the scope of this study, but it is clear to us that bar coding the GBL number would be a valuable component of any such system. A fast and accurate scan of the GBL number could call up prepositioned "electronic GBLs" from suspense files, prepare DISREPs, and make carrier payments. The bar coded GBL number would be of great value in tracking shipments, should a real-time tracking system be instituted by either the Government or its contract carriers.

We observed one private sector parallel to the GBL that is bar coded. The Federal Express Airbill has a bar coded airbill number, which is scanned on pickup, at various key points in the shipping and sorting process, and on delivery to the customer. The Airbill is a multi-part form, similar in concept to the GBL, sequentially numbered, and bar coded when printed. Federal Express uses a real-time tracking system and can determine the location of any package in the company's possession at any given time. Bar coding is a vital component of this highly automated system. Several lessons can be learned from Federal Express' bar coding experiences: Sequentially numbered bar coded multi-part forms can work in the transportation arena, and electronically transferred shipment data improve the productivity of transportation information systems.

In summary, there is no need now for bar coded GBL numbers, but there is much potential for improving GBL processing productivity through electronic transfer and storage of GBL data. A bar coded GBL number would be of great value in the systems we suggest. We recommend bar coding the GBL number as an incentive for developing such systems.

MATERIAL INSPECTION AND RECEIVING REPORT

Although the DD 250 is used for supply receiving, contract administration, and vendor payment, potential benefit exists from bar coding in supply receiving only. At supply depots, prepositioned data are resident on ADP systems, and bar coding as many as four elements (contract number, order number, contract line item number, and NSN) would enable users to call up on-line records quickly and accurately. Since two of those elements are already bar coded on exterior shipping containers, there is some concern that additional bar coding of the DD 250 may not yield substantial savings. It is our observation, however, that receiving lines are better set up for data

entry from forms than from containers, that bar coded container labels are not widely used, and that manual keyboard entry from documentation is still the most prevalent means of data entry.

Contractors prepare the DD 250, and generally on conventional typewriters. If bar coding were mandated by DoD, the contractors would be forced to acquire additional bar code printing capabilities they may not now have. Judging from industry's reaction to DoD's LOGMARS current bar code marking requirements, we must presume a less-than-enthusiastic reception to DD 250 bar coding. It is very important, therefore, that benefits from bar coded DD 250s justify the added cost (which will most certainly be passed on to DoD).

We recommend a prototype test of bar coded DD 250s in supply receiving. The purpose of the test would be to measure the benefits of bar coding the four proposed data elements in terms of increases in processing speed and accuracy. We recommend that bar coded labels be attached to a sample of the DD 250s received at the test depot and that a time study be performed to compare the time needed to process bar coded DD 250s with the time needed to process standard DD 250s. We further recommend that the test depot have prepositioned receipt data for a large proportion of its total receipts and have had experience with bar coding in the receiving process. The depot that appears best suited to this test from our perspective is the New Cumberland Army Depot.

Though the benefits of bar coding the DD 250 may be measured in-house, measuring the costs must involve DoD contractors. We recommend that a second phase of the prototype test be an investigation of bar code printing equipment costs and a survey of industry to determine what additional costs would be charged for this new contractual requirement. The third and final phase of the prototype test would be a cost-benefit analysis based on the results of phases 1 and 2.

APPENDIX A

LOGMARS DATA COLLECTION QUESTIONNAIRE

A. OPERATIONS IN EXISTING SYSTEM (applies to manual/automated systems)

(1) What is done?

(2) Why is it done this way?

(3) Why is it done at all (i.e., is it really necessary) and can as good a result be obtained without this step?

(4) Who does it (i.e., occupation of individual, organization, etc.) and why does this person or organization do it?

(5) When is it done and why is it done then?

(6) When, why, and where is it started and can it be done better or more conveniently some place else?

(7) How much time does it take (average and maximum/minimum)?

(8) What are the potential errors and omissions, and what procedures are used to effect corrections?

(9) What are the potential delays?

(10) What directives provide guidance for the processes?

(11) Are there any signature requirements and, if so, what directives require them?

(12) Is bar coding technology presently employed in this system?

B. INPUTS AND OUTPUTS OF THE EXISTING SYSTEM

(1) What is the format (e.g., form, card, etc.)?

(2) Is it mechanized or manual?

(3) What is the purpose of each copy and its routing?

(4) How is it compiled, filled out, sorted, reproduced, checked and when required?

(5) What are the potential errors and omissions, and what procedures are used to effect corrections?

(6) What are the potential delays?

(7) What are the data elements, their source and disposition?

(8) What are the volumes (if input/output can be mechanized or manual, percentage of each)?

(9) How and when is it received?

(10) Where does it come from, and what is its destination?

(11) Is it used as is, checked, modified or just passed on?

(12) What is the ultimate use, retention time, filing procedure and disposition of all copies?

(13) Are there any signature requirements and, if so, what directives require them?

(14) Are alternative inputs/outputs ever used and, if so, what are they?

C. COMPUTER OR OTHER RELATED EQUIPMENT IN EXISTING SYSTEM

(1) What type of ADPE is installed (i.e., peripherals, CPUs, etc.) to support the operation?

(2) What type of bar code equipment is installed to support the operation?

D. OPERATIONS IN THE PROTOTYPE SYSTEM

(1) Proposed data elements to be bar coded and why? (Note: Previous proposals for different but similar type documents have recommended TCN, NSN, document number and piece number.)

(2) Proposed minimum data elements (both human readable and bar coded) required and why?

(3) Proposed signature requirement changes and why?

(4) Proposed document flow and why?

(5) Proposed bar code mark and scan points and why?

(6) Proposed type and quantities of bar code equipment (type, not manufacturer) and why?

E. RECOMMENDED PROTOTYPE SITE(S): Name and location of proposed prototype site(s).

APPENDIX B

DATA CALL RESPONDENTS

These organizations responded to the LOGMARS project data call for information about the U.S. Government Bill of Lading (SF1103 or GBL) and the Material Inspection and Receiving Report (DD 250).

ORGANIZATION	GBL	DD 250
ARMY:		
Army Materiel Command (AMCPP-SO)		X
Armament, Munitions, and Chemical Command	X	
Depot System Command	X	
Fort Bliss	X	
Fort Gordon	X	
Fort Jackson	X	
Fort Leavenworth	X	
Fort Lee	X	
Fort Leonard Wood	X	
Fort McClellan	X	
Fort Sill	X	
Military Traffic Management Command	X	
NAVY (Headquarters and Staff):		
Naval Facilities Engineering Command	X	X
Naval Sea Systems Command (NSEA-07)	X	X
Naval Sea Systems Command (NSEA-641)	X	X
Naval Sea Systems Command (NSEA-905B)	X	X
Naval Supply Systems Command (NSUP-021)		X
Naval Supply Systems Command (NSUP-052)	X	
Naval Supply Systems Command (NSUP-061)	X	
NAVY (Field/Fleet):		
Naval Air Station Alameda	X	X
Naval Air Station Barbers Point	X	X
Naval Air Station Chase Field	X	X
Naval Air Station Cubi Point	X	X
Naval Air Station Kingsville	X	X
Naval Air Station Lemoore	X	X
Naval Air Station Miramar	X	X
Naval Air Station Moffett Field	X	X
Naval Air Station North Island	X	X

ORGANIZATION	GBL	DD 250
NAVY (Field/Fleet):		
Naval Air Station Pensacola	X	X
Naval Air Station Whidbey Island	X	X
Naval Air Station Whiting Field	X	X
Naval Education and Training Command, Newport	X	X
Naval Forces Europe	X	X
Naval Material Transportation Command	X	
Naval Reserve Command	X	X
Naval Supply Center Norfolk		X
Naval Supply Depot Guam	X	X
Naval Supply Depot Subic bay	X	X
Naval Surface Forces Pacific	X	X
AIR FORCE:		
Air Force Logistics Command (for the 2750th Air Base Wing at Wright-Patterson AFB and the Warner Robins Air Logistics Center)	X	X
MARINE CORPS:		
Marine Corps Air Station El Toro	X	X
Marine Corps Air Station Yuma	X	X
Marine Corps Base Camp Butler		X
Marine Corps Base Camp Lejeune		X
Marine Corps Base Camp Pendleton	X	
Marine Corps Base Twentynine Palms	X	X
Marine Corps Development and Education Command	X	X
Marine Corps Logistics Base Albany	X	X
Marine Corps Logistics Base Barstow	X	X
Marine Corps Recruit Depot Parris Island	X	X
Marine Corps Recruit Depot San Diego	X	X
DEFENSE LOGISTICS AGENCY:		
Defense Mechanization Support Office (for the Defense General Supply Center)	X	X
GENERAL SERVICES ADMINISTRATION:		
Federal Supply Service (for the ten regional GSA depots)	X	

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